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In a "Report on the Collections made by the Southern Cross," Dr. Boulenger records species of fishes taken in Antarctic regions. In this is given a useful synopsis of genera and species of Nototheniidæ, a family of fishes especially characteristic of that region.

Pleuragramma antarcticum a leptoscopoid fish, was taken at Lat. $78^{\circ}35'$ south, the southernmost fish yet known.

In the *Popular Science Monthly* Mr. Cloudsley Rutter gives the results of elaborate studies in the Natural History of the salmon of the Sacramento River.

D. S. J.

Hay on Fossil Vertebrates. — Under the head of Bibliography and Catalogue of the Fossil Vertebrate of North America, in the *Bulletin of the United States Geological Survey* (No. 179), Dr. Oliver Perry Hay has published a work of immense practical value to the student of Zoölogy. It is a conscientious and laborious compilation of the kind that wins gratitude rather than fame, although amply deserving both.

The synonymy of each name of group, genus and species is given, with a reference to the original type of each genus and the type locality of each species. The rules of nomenclature of the American Ornithologists' Union are adopted and consistently applied, and the general sequence and classification is that approved by American authors. Of fossil fishes, about 1000 species are enumerated, nearly one third as many as now inhabit the region (North America) under discussion.

The series begins with the Ichthyotomus sharks, Ichthyotomi being regarded as a "Superorder," including the Pleuropterygia and the Acanthodii as well as the Pleuracanthine sharks. As against the Ichthyotomi the other sharks are set off as a second superorder called Euselachii. The generic name, Acanthoëssus on account of priority, is substituted for the familiar name Acanthodes. It is claimed by Bashford Dean that the species on which Acanthoëssus is based is not certainly identified. Unless this plea is maintained, Acanthoëssus must stand.

A new family, Tamiobatidæ, is established for Eastman's genus, Tamiobatis, from palæozoic rocks in Kentucky. The name Pisces is defined so as to include all fishes except the sharks; Gill's name, Aspidoganoidei is used instead of the preoccupied name of Ostracodermi and Cope's later substitute of Ostracophori. The name "Aspidoganoïd" seems unfortunate, as these fantastic creatures have little in common with ganoids. For a group containing the Arthrodira

and Dipnoans, Dr. Hay proposes a new subclass, Azygostei, the Crossopterygians, Ganoids and ordinary fishes forming a third subclass, Teleostomi. Apparently the relative position of Dipnoans, Crossopterygians, Arthrodira and Aspidoganoids is not yet clear enough to render this arrangement inevitable. The Arthrodira may be allied to the Aspidoganoids; the Aspidoganoids may be modified sharks, or even modified lampreys. The Crossopterygians may be ancestors of Dipnoans on the one hand and of Ganoids and bony fishes on the other, and there are numerous other elements of uncertainty. Under the head of the superorder Placodermi, Dr. Hay removes the Antiarcha (*Asterolepis* etc.) from the Aspidoganoids, and places them alongside the Arthrodira, which are regarded as a second order of Placoderms. The other superorder of Azygostei is that of Dipnoi. Pterichthyodes is necessarily substituted for the familiar but preoccupied name, Pterichthys; Phlyctænaspis is needlessly substituted for Phlyctænius, on account of the earlier name Phlyctænium. Naturalists must sooner or later come to the rule that a name is constituted by its spelling, not by its etymology. Words spelled differently are different words. Puer is a definably different creature from *puella*, whatever the likeness.

Under the subclass Teleostomi, we have two superorders, Crossopterygia and Actinopteri. The name Ganoid disappears, the different types forming three orders, Chondrostei, Pycnodonti and Holostei, at the base of the series of Actinopteri. The name Megalichthys replaces the later Rhizodus, and Parabatrachus is applied to the genus formerly wrongly called Megalichthys. Palæoniscum is restored as the original spelling of Palæoniscus, and Lepisosteus as the original, though unclassic orthography of Lepidosteus. Redfieldius is used for the genus, wrongly called Catopterus, by J. H. Redfield.

Ginglymodi is restored as the name of the suborder of Gars, and Halecomorphi for the relatives of Amia. The name Eugnathus, preoccupied, is replaced by Isopholis; Erisichthe and Pelecopterus are united with Protosphyræna and placed with the Pachycormidæ among the Halecomorphi.

The Nematognathi are separated from the Plectospondyli and placed before the Isospondyli, where apparently they do not belong. The Suckers are reduced to a subfamily of Cyprinidæ. A new order, Phthinobranchii, is proposed to include the Hemibranchii and the Lophobranchii, two groups not fundamentally distinct. The Cato-steomi of Boulenger corresponds to this group, except for the inclusion of *Lampris*, a genus of peculiar and primitive structure, but surely

not related to the stickle-backs. Another new order, Mesichthyces, is proposed to include the Haplomi, Synentognathi and Percesoces. But while these groups are closely related, they differ almost as much among themselves as the Haplomi differ from some Isospondyli or the Percesoces from some Percomorphi. It is not clear that the Phthinobranchii really differ much from the Percesoces, especially since Mr. Starks has shown that the interclavicle, or infraclavicle, supposed to distinguish the former, is merely an expansion of the *hypocoracoid*, and that it is wanting in *Macrorhamphosus*, *Centriscus* and *Aeoliscus* among the Hemibranchs. The arrangement of these transitional fishes in distinct orders, or suborders, offers very great difficulties, because the groups, adopted though natural, are not set off by strong characters.

The Chætodonts, Labroids and Pomacentrids are placed first among Percomorphous fishes—for no evident reason, as the Berycidae are more primitive in structure and earlier in time. Surely Chætodipterus does not belong to Chætodontidae, nor Priscacara to the Pomacentridae, nor Platax to the Carangidae.

Erismatopterus, Amphiplaga, Asineops and Trichophanes are placed in the Aphredoderidae. Near the Aphredoderidae, would be safer. The suborder Pareioplitæ replaces the preoccupied name Loricati for the mailed-cheek fishes.

Dr. Hay has earned the lasting thanks of his brother ichthyologists for the pains he has taken in this work, and the portions treating of the groups higher than fishes will doubtless be found as carefully done and as helpful.

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Notes.—Ikeda (*Journal of the College of Science*, Tokyo, Vol. XVII) has made an extended series of experiments to determine the mode of closure of the blastopore and the position of the embryonic body in amphibian eggs. He shows that the results obtained by puncturing eggs and by other similar methods can never be depended upon to reveal the normal course of development, for widely differing results are obtained depending upon the position of the puncture. He believes that the embryonic body in Amphibia may be formed at any position on the egg surface, and that many authors have overlooked or underestimated the varying rate at which different parts of the blastoporic lip enclose the yolk-mass, a rate which determines the final closing point of the blastopore and consequently the position of the embryo.